

1. In a system for processing MPEG data in preparation for displaying video images encoded in the MPEG data, a method for subsampling the MPEG data to reduce the volume of video data processed to display the video images, comprising the acts of:

processing one or more motion vectors in order to produce coordinates for fetching prediction data from a previously decoded and subsampled reference frame;

processing the reference frame and the one or more motion vectors of the MPEG data using a frame prediction module to generate predicted subsampled frame data;

processing frequency coefficients of the MPEG data using an inverse discrete cosine transformer (IDCT) to generate IDCT output data;

decimating the IDCT output data by a selected factor to generate decimated IDCT output data; and

summing the predicted subsampled frame data and the decimated IDCT output data to generate video images encoded in a reduced volume of video data.

2. The method as recited in claim 1, wherein the act of decimating the IDCT output by a selected factor comprises the act of decimating the IDCT output by a factor of two.

3. The method as recited in claim 1, wherein the MPEG data, prior to the act of decimating, is originally formatted for display on a display device with a first video resolution, the method further comprising the act of displaying the generated video images

on a display device having a second video resolution that is less than the first video resolution.

4. The method as recited in claim 3, wherein:

the display device having the first video resolution is a high definition television; and

the display device having the second video resolution is a standard television.

5. The method as recited in claim 1, further comprising the act of displaying the video images in a window in a picture-in-picture display, the window having a resolution less than a resolution of the MPEG data as the MPEG data existed prior to the act of decimating.

6. A method as recited in claim 1, wherein the act of decimating comprises the act of subsampling the IDCT output data by a first factor in a first direction and by a second factor in a second, perpendicular direction, such that the IDCT output data is decimated by the selected factor.

7. A method as recited in claim 6, wherein the first factor is equal to the second factor.



1           9.     In a system for processing MPEG data in preparation for displaying video  
2 images encoded in the MPEG data, a method for subsampling the MPEG data to reduce  
3 the volume of video data processed to display the video images, comprising the acts of:

4                 processing a reference frame and motion vectors of the MPEG data in a  
5 frame prediction module to generate predicted frame data;

6                 transforming frequency coefficients of the MPEG data to a spatial domain  
7 to obtain spatial domain data associated with the MPEG data;

8                 subsampling the spatial domain data by a selected factor to generate  
9 subsampled spatial domain data; and

10                summing the predicted frame data and the subsampled time domain data to  
11 generate video images encoded in a reduced volume of video data; and

12                buffering frames of the video images in frame buffers having a size that is  
13 smaller than that which would have been required to buffer frames of the video  
14 images if the act of subsampling were not performed.

15  
16           10.    The method as recited in claim 9, wherein the MPEG data, prior to the act  
17 of subsampling, is originally formatted for display on a display device with a first video  
18 resolution, the method further comprising the act of displaying the generated video images  
19 on a display device having a second video resolution, wherein the second video resolution  
20 that is lower than first video resolution.

21  
22           11.    The method as recited in claim 10, wherein:

23                 the display device having the first video resolution is a high definition  
24 television; and

1 the display device having the second video resolution is a standard  
2 television.

3  
4 12. The method as recited in claim 9, further comprising the act of displaying  
5 the video images in a window in a picture-in-picture display, the window having a  
6 resolution less than a resolution of the MPEG data as the MPEG data existed prior to the  
7 act of subsampling.

8  
9 13. The method as recited in claim 9, wherein the act of processing a reference  
10 frame and motion vectors comprises the act of decimating the motion vectors using the  
11 selected factor by which the spatial data is subsampled.

12  
13 14. The method as recited in claim 9, wherein the act of subsampling the spatial  
14 data is performed in the vertical direction and comprises the acts of:

15 weighting a color parameter of a first spatial sample using a first weighting  
16 factor;

17 weighting a color parameter of a second spatial sample using a second  
18 weighting factor; and

19 summing the weighted color parameter of the first spatial sample and the  
20 weighted color parameter of the second spatial sample to generate a color  
21 parameter of a subsample that corresponds to the first spatial sample and the second  
22 spatial sample.

23  
24 15. The method as recited in claim 14, wherein:

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24

- the MPEG data comprises non-interlaced video data;
- the second spatial sample is immediately vertically adjacent to the first spatial sample; and
- the first weighting factor and the second weighting factor are equal.
16. The method as recited in claim 14, wherein:
- the MPEG data comprises interlaced video data;
- the first sample and the second sample are vertically adjacent in a field of the interlaced video data;
- the first weighting factor is different from the second weighting factor.
17. The method as recited in claim 16, wherein:
- the first weighting factor is equal to  $\frac{3}{4}$ ; and
- the second weighting factor is equal to  $\frac{1}{4}$ .

1           18.     A computer program product for implementing, in a system for processing  
2 MPEG data in preparation for displaying video images encoded in the MPEG data, a  
3 method for subsampling the MPEG data to reduce the volume of video data processed to  
4 display the video images, the computer program product comprising:

5                     a computer-readable medium carrying computer-executable instructions,  
6 that when executed at the system, cause the system to perform the acts of:

7                             processing one or more motion vectors in order to produce  
8 coordinates for fetching prediction data from a previously decoded and  
9 subsampled reference frame;

10                            processing the reference frame and the one or more motion vectors  
11 of the MPEG data using a frame prediction module to generate predicted  
12 subsampled frame data;

13                            processing frequency coefficients of the MPEG data using an  
14 inverse discrete cosine transformer (IDCT) to generate IDCT output data;

15                            decimating the IDCT output data by a selected factor to generate  
16 decimated IDCT output data; and

17                            summing the subsampled predicted frame data and the decimated  
18 IDCT output data to generate video images encoded in a reduced volume of  
19 video data.

20  
21           19.     The computer program product as recited in claim 18, wherein the act of  
22 decimating the IDCT output by a selected factor comprises the act of decimating the IDCT  
23 output by a first factor in a first direction and a second factor in a second perpendicular  
24 direction, such that the IDCT output is decimated by the selected factor.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24

20. The computer program product as recited in claim 18, further comprising the act of identifying the selected factor, the selected factor being identified to reduce the volume of MPEG data that is to be processed to display the video images and to retain enough video data to display the video images at a video resolution that is supported by a display device associated with said system.

21. The computer program product as recited in claim 18, wherein the MPEG data, prior to the act of decimating, is originally formatted for display on a display device with a first video resolution, the computer-executable instructions, when executed at the system, further causing the system to perform the act of displaying the generated video images on a display device having a second video resolution that is less than the first video resolution.

22. The computer program product as recited in claim 21, wherein:

the display device having the first video resolution is a high definition television; and

the display device having the second video resolution is a standard television.

23. The computer program product as recited in claim 18, wherein the computer-executable instructions, when executed at the system, further cause the system to perform the act of displaying the video images in a window in a picture-in-picture display,



1 the window having a resolution less than a resolution of the MPEG data as the MPEG data  
2 existed prior to the act of decimating.